

Chapter 1:
Asthma Prevalence



Asthma Prevalence

Asthma can be a difficult condition to diagnose. The course of asthma can vary from person to person. This may include weeks to months of symptom-free periods, intermittent or minimal symptoms, or even persistent symptoms at night or during exercise. A diagnosis of asthma usually requires a person to have three or more episodes of wheezing. This can take time and often a diagnosis can be made only after an extended period of observation and testing. The disease may last a lifetime in some people but not in others. Due to these factors, prevalence is a more appropriate measure of asthma than incidence^a.¹ Prevalence is a measure of the number of persons in the population affected by a disease at a certain time. Prevalence can be viewed as a slice through the population at a point in time at which it is determined who has the disease and who does not.²

Determining the prevalence of asthma in a population is very important, and can be obtained most effectively through surveys.¹ In North Carolina, the North Carolina Behavioral Risk Factor Surveillance System (N.C. BRFSS) and the Childhood Health Assessment and Monitoring Program (N.C. CHAMP) are two of the current instruments that are used to determine asthma prevalence. The N.C. BRFSS looks at North Carolina residents 18 years and older, while the N.C. CHAMP concentrates on those 17 years and younger. Persons who have asthma are determined by those who answer yes to the survey questions *“Did a doctor (or other health professional) ever tell you (or any household member) that you (they) had asthma”* or *“Do you (or the other household member) still have asthma”*.³

Because of the nature of asthma, the disease can appear to resolve itself after long periods of being symptom free.¹ Therefore, asthma prevalence is classified in two ways: lifetime and current prevalence. Lifetime asthma prevalence is defined as an affirmative answer to the question *“Have you ever been told by a doctor, nurse, or other health professional that you have asthma?”* Current asthma prevalence is defined as an affirmative response to the lifetime asthma prevalence question, as well as an affirmative response to the subsequent question *“Do you still have asthma?”*⁴

It is important to note that asthma remains an underdiagnosed and undertreated disease. Yeatts et al. (2003) looked at middle school children in North Carolina and determined that 17% of children in this population reported current asthma-like symptoms with no corresponding diagnosis of asthma from health care professional. These children suffered health consequences similar to those who had a diagnosis of asthma, including missed school/activity, sleep disturbances, emergency room visits, and hospitalizations.⁵⁵ The prevalence numbers that will be presented in this document are, therefore, to be considered conservative, with actual prevalence possibly being much higher.



^a Incidence of a disease is defined as the number of new cases of a disease that occur during a specified period of time in a population at risk for developing the disease.²

Adult Asthma Prevalence

The North Carolina adult (≥ 18 years old) prevalence was obtained from the N.C. BRFSS. The N.C. BRFSS is a population-based, annual, random telephone survey of residents aged 18 and older in households with telephones. The BRFSS was initially developed in the 1980s by the Centers for Disease Control and Prevention (CDC) in collaboration with state health departments, and is currently conducted in all 50 states and several U.S. territories. North Carolina has participated in conducting the BRFSS since 1987. Questions related to asthma prevalence have only been included in the N.C. BRFSS since 2000 and the current information includes 6 years of data.⁵

In 2005, the N.C. BRFSS had a response rate of 76.14%, with 17,261 surveys completed. This number of completed surveys was second only to Washington State. The average number of surveys completed for all states/territories was 6,719.

The telephone survey format of the N.C. BRFSS has many advantages, including better quality control over data collection using a computer-assisted telephone interviewing system, relatively low cost, and speed of data collection.⁶ Additional strengths of the N.C. BRFSS include the fact that the answers are representative of adults in North Carolina and that it offers the opportunity to examine trends over time.

While the N.C. BRFSS is the best means of measuring adult asthma prevalence, it does have some limitations. Because it is a telephone survey, those persons who live in a household without a telephone are not included. However, approximately 95% of households in North Carolina have at least one telephone, so the degree of understatement is probably not large. Another limitation is that the data are self-reported by respondents. The validity of self-reported asthma status in the BRFSS is unknown. Finally, the N.C. BRFSS only tracks diagnosed asthma. People who have symptoms of asthma, but have not yet been diagnosed by a health care provider, would answer “no” when asked if a doctor, nurse, or other health professional had ever told them they have asthma.^{6,7,8}

For North Carolina adults, both the lifetime and current asthma prevalence have remained slightly below the national median for the last 6 years, according to the BRFSS. Slight increases in the lifetime and current asthma prevalence for adults in North Carolina have been seen from 2001 through 2004. However, with the release of the 2005 N.C. BRFSS, there is a decrease in the current asthma prevalence among adults in North Carolina, as well as a statistically significant decrease in the lifetime asthma prevalence in adults.

Figure 1. Prevalence of Lifetime and Current Asthma for Adults (≥ 18 years), United States¹ and North Carolina, 2000-2005

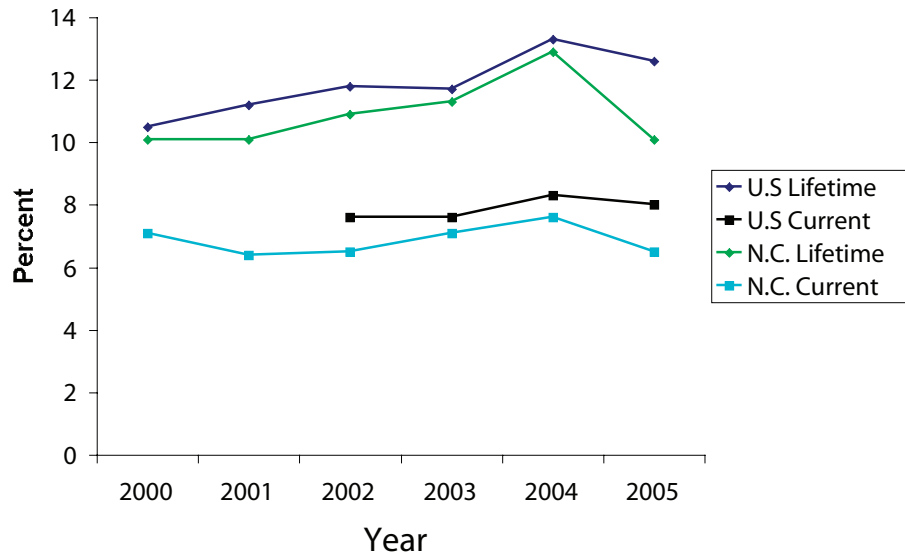


Table 1. Lifetime and Current Asthma Prevalence for the United States and North Carolina, Adults (≥ 18 years old), 2000-2005

	2000	2001	2002	2003	2004	2005
U.S. Lifetime	10.5%	11.2%	11.8%	11.7%	13.3%	12.6%
U.S. Current	*	*	7.6%	7.6%	8.3%	8.0%
N.C. Lifetime (95% CI)	10.1% (9.0, 11.5)	10.1% (8.9, 11.4)	10.9% (9.7, 12.1)	11.3% (10.3, 12.4)	12.9% (12.2, 13.6)	10.1% (9.5, 10.7)
N.C. Current (95% CI)	7.1% (6.1, 8.2)	6.4% (5.5, 7.5)	6.5% (5.6, 7.5)	7.1% (6.3, 7.9)	7.6% (7.0, 8.1)	6.5% (6.0, 7.0)

¹ No confidence intervals (CI) are available as these numbers are the median percentage of the responses from 52 states (# of States includes District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands in applicable years)

*No data available

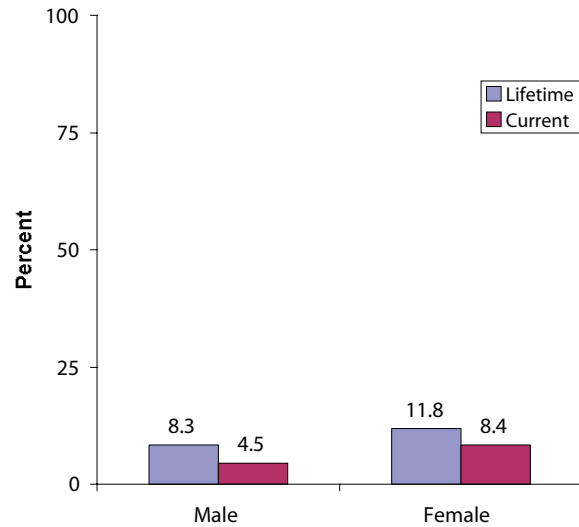
Data Source: BRFSS, United States⁵⁰ and North Carolina, 2000-2004

Summary of Figure 1 and Table 1:

- North Carolina has consistently had a lower current and lifetime asthma prevalence than the national median.

Lifetime and Current Asthma

Figure 2. Prevalence of Lifetime and Current Asthma for Adults (≥ 18 years), by Sex, North Carolina, 2005



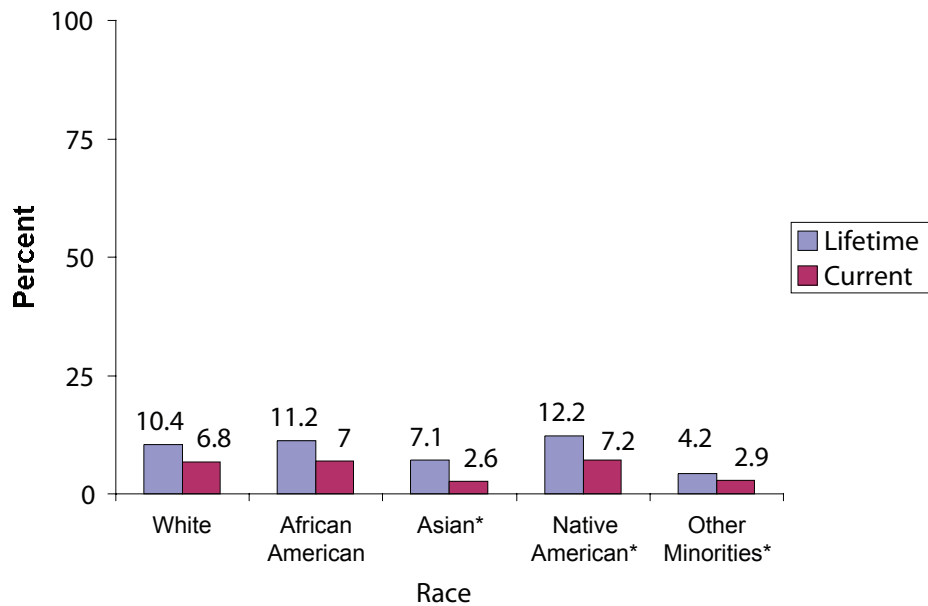
Data Source: BRFSS, North Carolina, 2005

Summary of Figure 2:

- Since the N.C. BRFSS began including asthma questions in 2000, gender differences with asthma have been seen. North Carolina women are more likely than men to report having lifetime or current asthma. This is consistent with the information we have that among the general population; the prevalence of asthma is higher among females than males.⁹
- The prevalence of lifetime asthma has been higher for women than men for the past 6 years. Women's lifetime asthma prevalence was statistically significantly higher than men's in the years 2002, 2004, and 2005.
- The 2005 lifetime asthma prevalence in North Carolina for both men and women is lower than the national median lifetime asthma prevalence (male = 10.4%, female = 14.5%).¹⁰
- The prevalence of current asthma has been higher for women than men in North Carolina for the past 6 years. Women have had a statistically significant higher prevalence of current asthma for 4 of the past 6 years, 2000, 2003, 2004, and 2005.
- The 2005 current asthma prevalence for North Carolina men and women is lower than the national median current asthma prevalence (male = 5.7%, female = 10.3%).¹⁰



Figure 3. Prevalence of Lifetime and Current Asthma for Adults (≥ 18 years), by Race, North Carolina, 2005



* Prevalence based on numerator less than 50, interpret with caution.
Data Source: BRFSS, North Carolina, 2005

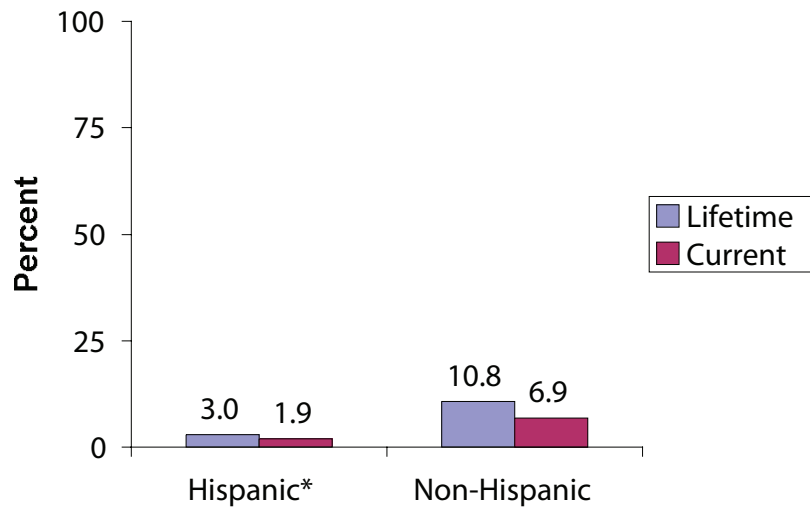
Summary of Figure 3:

- The differences between the racial groups for both lifetime and current asthma were not significant. However, in 2004, Native Americans had a significantly higher prevalence of current asthma than whites.
- White and African American North Carolinians had lifetime and current asthma prevalence lower than the national medians.

North Carolina has one of the largest American Indian populations east of the Mississippi River and among the top ten largest American Indian populations in the nation, according to the 2000 census.¹¹ Native Americans were more likely than whites to report having many chronic diseases, including 25% more likely to have ever been diagnosed with asthma.^{11, 12}



Figure 4. Prevalence of Lifetime and Current Asthma for Adults (≥ 18 years), by Hispanicity, North Carolina, 2005



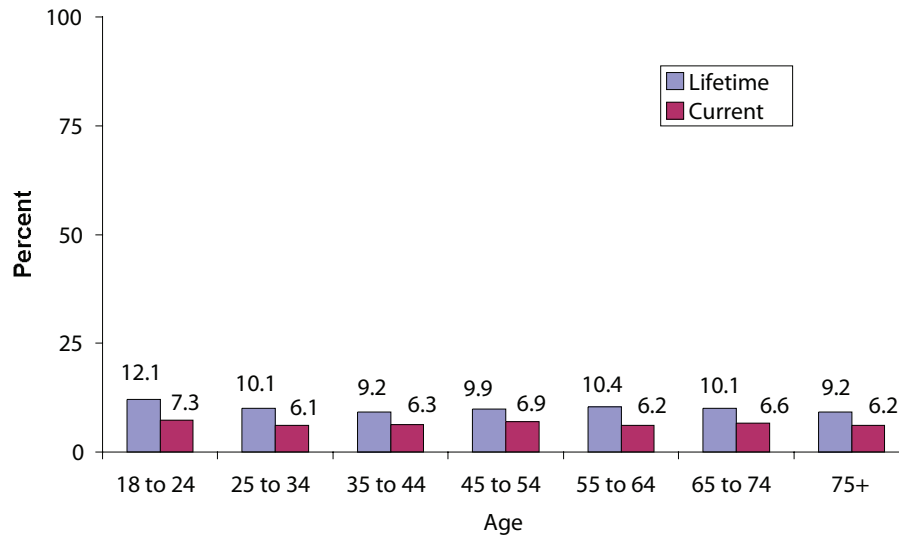
*Prevalence based on numerator less than 50, interpret with caution.
Data Source: BRFSS, North Carolina, 2005

Summary of Figure 4:

Lifetime and current asthma prevalence for North Carolina Hispanics were lower than the national medians, which are 10.3% for lifetime asthma for Hispanics nationally, and 5.9% for current asthma for Hispanics nationally. The N.C. BRFSS showed that Hispanic families who spoke Spanish at home have a lower lifetime asthma prevalence and current asthma prevalence than those Hispanic families who speak English at home. While the number of respondents was too small to draw definitive conclusions, this data implies that 2nd generation Hispanics have a higher asthma prevalence, which could be due to a number of external factors, including environmental factors and acculturation.

Nationally, according to the 2004 National Health Interview Survey (NHIS), Hispanic adults had lower rates of asthma than both white and African American adults.¹³ These results are potentially explained by the possibility of underdiagnosis due to lack of access to care among this group.⁵¹

Figure 5. Prevalence of Lifetime Asthma for Adults (≥ 18 years), by Age, North Carolina, 2005

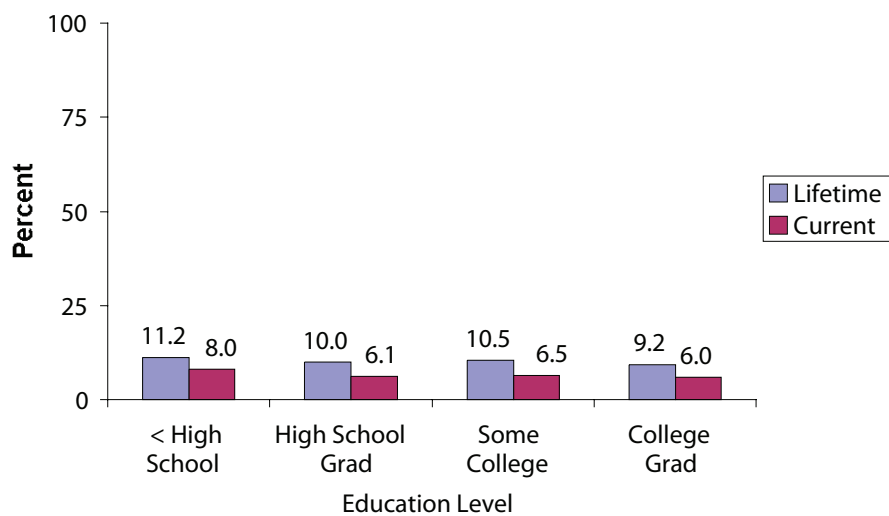


Data Source: BRFSS, North Carolina, 2005

Summary of Figure 5:

- Lifetime and current asthma prevalence were similar across the adult age groups.
- North Carolina lifetime asthma prevalence and current asthma prevalence for all adults in each age group tend to be lower than the national medians.

Figure 6. Prevalence of Lifetime and Current Asthma for Adults (≥ 18 years), by Education Level, North Carolina, 2005

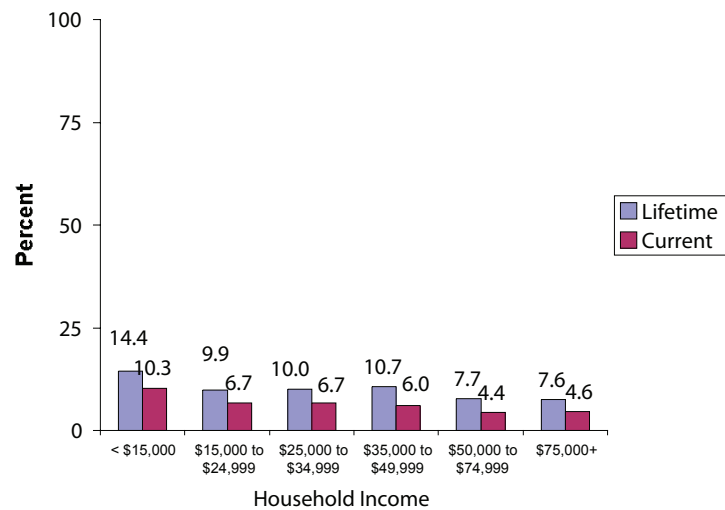


Data Source: BRFSS, North Carolina, 2005

Summary of Figure 6:

- In 2004, survey respondents with less than a high school education were significantly more likely to have lifetime asthma than either high school graduates or college graduates. Respondents with less than a high school education were also significantly more likely to have current asthma than all other education groups.
- In 2005, significant differences were not seen in education level for either lifetime or current asthma prevalence.

Figure 7. Prevalence of Lifetime Asthma for Adults (≥ 18 years), by Household Income, North Carolina, 2005



Data Source: BRFSS, North Carolina, 2005

Summary of Figure 7:

- North Carolinians from a household with an income less than \$15,000 were significantly more likely to have a higher prevalence of both lifetime and current asthma than all other income groups. This is similar to national trends, which show that adults in poor^b families have higher percentages of asthma than adults in families that were not poor.¹³
- Those from a household with an income greater than \$50,000 had significantly lower lifetime asthma prevalence than North Carolinians living in a household with an income between \$35,000 and \$49,999.
- Households with an income greater than \$50,000 had significantly lower lifetime asthma prevalence than households with incomes less than \$25,000.
- The lifetime asthma prevalence and current asthma prevalence for North Carolinians at all household income levels was below the national medians.

^b Poverty status is based on family income and family size using the U.S. Census Bureau's poverty thresholds for the previous calendar year. "Poor" persons are defined as below the poverty threshold.¹³



Table 2. Lifetime Asthma Prevalence by Sex, Race, Ethnicity, Age Group, Education, and Household Income, North Carolina, 2003-2005

	Lifetime Asthma Prevalence					
	2003		2004		2005	
	Rate (%)	95% CI	Rate (%)	95% CI	Rate (%)	95% CI
Total	11.3	10.3-12.4	12.9	12.2-13.6	10.1	9.5-10.7
Sex						
Male	10.0	8.5-11.8	10.8	9.8-11.9	8.3	7.4-9.2
Female	12.5	11.3-13.8	14.7	13.9-15.7	11.8	11.1-12.6
Race						
White	11.0	9.9-12.2	13.0	12.2-13.9	10.4	9.7-11.2
African American	13.8	11.4-16.5	14.5	12.8-16.2	11.2	9.8-12.9
Asian	0.4*	0.1-3.0	6.6*	2.6-15.9	7.1*	3.4-14.6
Native American	16.7*	7.6-32.8	18.4	13.5-24.5	12.2*	8.5-17.2
Other Minorities	7.6*	4.4-12.7	5.6*	3.7-8.5	4.2*	2.8-6.2
Ethnicity						
Hispanic	7.5*	4.4-12.5	5.7*	3.8-8.3	3.0*	2.1-4.3
Non-Hispanic	11.5	10.5-12.6	13.4	12.7-14.1	10.8	10.1-11.4
English Speaking Hispanic	12.6*	6.1-24.4	10.7*	6.8-16.4	8.0*	5.0-12.4
Spanish Speaking Hispanic	5.8*	2.7-11.8	3.4*	1.7-6.7	1.6*	0.9-2.9
Age						
18 to 24	15.4	11.4-20.6	17.9	14.7-21.7	12.1	9.6-15.1
25 to 34	10.5	8.4-13.0	10.4	8.9-12.1	10.1	8.7-11.6
35 to 44	10.8	8.8-13.0	14.0	12.4-15.7	9.2	8.1-10.4
45 to 54	10.3	8.3-12.6	13.4	11.9-15.1	9.9	8.8-11.2
55 to 64	10.5	8.4-12.9	13.4	11.9-15.1	10.4	9.2-11.7
65 to 74	12.6	10.1-15.6	11.2	9.7-12.9	10.1	8.8-11.6
75+	9.8	7.5-12.8	11.2	9.3-13.4	9.2	7.7-10.9
Education Level						
< High School	11.7	9.7-14.0	15.3	13.5-17.3	11.2	9.5-13.1
High School Grad	12.0	10.1-14.2	11.9	10.8-13.2	10.0	8.9-11.2
Some College	11.4	9.4-13.9	13.4	12.1-14.9	10.5	9.4-11.7
College Grad	10.3	8.8-12.1	11.8	10.7-13.1	9.2	8.3-10.3
Household Income						
< \$15K	16.2	13.1-20.0	18.6	16.4-21.1	14.4	12.5-16.5
\$15K to \$24,999	12.3	9.9-15.1	13.5	11.8-15.4	9.9	8.6-11.3
\$25K to \$34,999	12.9	9.8-16.9	11.0	9.3-12.9	10.0	8.4-11.8
\$35K to \$49,999	10.2	7.7-13.5	12.7	10.9-14.7	10.7	9.3-12.4
\$50K to \$74,999	9.4	7.1-12.2	10.0	8.4-11.9	7.7	6.5-9.2
\$75K +	6.9	5.3-9.0	11.3	9.7-13.2	7.6	6.4-9.0

*Based on numerator less than 50, interpret with caution.
Data Source: BRFSS, North Carolina, 2003, 2004, 2005

Table 3. Current Asthma Prevalence by Sex, Race, Ethnicity, Age Group, Education, and Household Income, North Carolina, 2003-2005

	Current Asthma Prevalence					
	2003		2004		2005	
	Rate (%)	95% CI	Rate (%)	95% CI	Rate (%)	95% CI
Total	7.1	6.3-7.9	7.6	7.0-8.1	6.5	6.0-7.0
Sex						
Male	5.2	4.2-6.5	5.2	4.5-6.0	4.5	3.9-5.3
Female	8.9	7.9-10.0	9.8	9.0-10.6	8.4	7.7-9.1
Race						
White	7.0	6.1-8.0	7.6	7.0-8.3	6.8	6.2-7.4
African American	8.0	6.4-9.9	8.4	7.2-9.8	7.0	5.8-8.3
Asian	0.4*	0.1-3.0	6.1*	2.2-15.5	2.6*	0.8-8.0
Native American	12.2*	4.6-28.7	13.2*	9.3-18.3	7.2*	4.8-10.8
Other Minorities	5.2*	2.8-9.6	3.6*	2.1-6.2	2.9*	1.8-4.8
Ethnicity						
Hispanic	4.3*	2.2-8.4	3.5*	2.1-5.8	1.9*	1.2-3.0
Non-Hispanic	7.2	6.4-8.1	7.9*	7.3-8.4	6.9	6.4-7.5
English Speaking Hispanic	5.0*	2.1-11.4	7.3*	4-13	6.0*	3.4-10.4
Spanish Speaking Hispanic	4.1*	1.7-9.7	1.7*	0.6-4.4	0.8*	0.4-1.5
Age						
18 to 24	7.5*	4.9-11.4	8.4	6.3-11.3	7.3	5.3-9.8
25 to 34	5.7	4.3-7.6	6.2	5.0-7.5	6.1	5.0-7.4
35 to 44	7.1	5.6-9.0	7.1	6.1-8.3	6.3	5.3-7.3
45 to 54	6.5	5.0-8.4	8.0	6.8-9.3	6.9	6.0-8.0
55 to 64	7.0	5.4-9.0	9.3	7.9-10.8	6.2	5.3-7.3
65 to 74	9.1	7.0-11.8	7.4	6.2-8.8	6.6	5.5-7.8
75+	8.0	5.9-10.8	7.1	5.5-9.1	6.2	5.0-7.7
Education Level						
< High School	9.7	8.0-11.9	10.4	9.0-12.1	8.0	6.6-9.6
High School Grad	6.1	4.9-7.6	7.1	6.2-8.1	6.1	5.3-7.1
Some College	6.8	5.3-8.8	7.4	6.4-8.5	6.5	5.6-7.5
College Grad	6.8	5.5-8.4	6.5	5.6-7.4	6.0	5.2-6.9
Household Income						
< \$15K	12.5	10.0-15.5	12.6	10.8-14.7	10.3	8.7-12.2
\$15K to \$24,999	7.4	5.7-9.7	8.4	7.1-9.9	6.7	5.6-8.0
\$25K to \$34,999	8.3	5.7-11.8	6.5	5.2-8.0	6.7	5.3-8.4
\$35K to \$49,999	6.6	4.6-9.5	7.6	6.2-9.3	6.0	4.9-7.2
\$50K to \$74,999	5.8	4.0-8.2	5.1	4.0-6.4	4.4	3.5-5.6
\$75K +	3.4	2.2-5.1	5.7	4.6-7.0	4.6	3.7-5.6

*Based on numerator less than 50, interpret with caution.
Data Source: BRFSS, North Carolina, 2003, 2004, 2005

Child Prevalence (≤ 17 years old)

Asthma is a leading chronic illness among children in the United States. The prevalence of asthma is higher among children than adults.⁹ An estimated 9 million (12.5%) of children younger than 18 years old have been diagnosed with asthma. As age increases, the percentage of children ever diagnosed with asthma increases.¹⁴ Rates of current asthma decreased with age, with children 17 years old or younger having a much higher rate (83 per 1,000) of asthma, than adults 18 years and older with asthma (68 per 1,000).¹²

North Carolina child asthma prevalence data was obtained from two primary sources, the North Carolina Child Health Assessment and Monitoring Program (CHAMP) and the Youth Risk Behavior Survey (YRBS). As with the adults in the N.C. BRFSS, asthma prevalence is estimated with two measures, lifetime asthma and current asthma. In N.C. CHAMP, lifetime asthma is estimated with the question “*Has a doctor ever told you your child has asthma?*” Current asthma is estimated with the question, “*Does your child still have asthma?*”

The N.C. CHAMP survey is a phone survey conducted as a continuation of the N.C. BRFSS. The children who are selected for the N.C. CHAMP are chosen through a child selection module that is conducted during the N.C. BRFSS. The N.C. CHAMP has similar benefits, limitations, and biases of the N.C. BRFSS.

Figure 8. Lifetime and Current Asthma Prevalence among Children (≤ 17 years), United States and North Carolina, 2001 – 2005

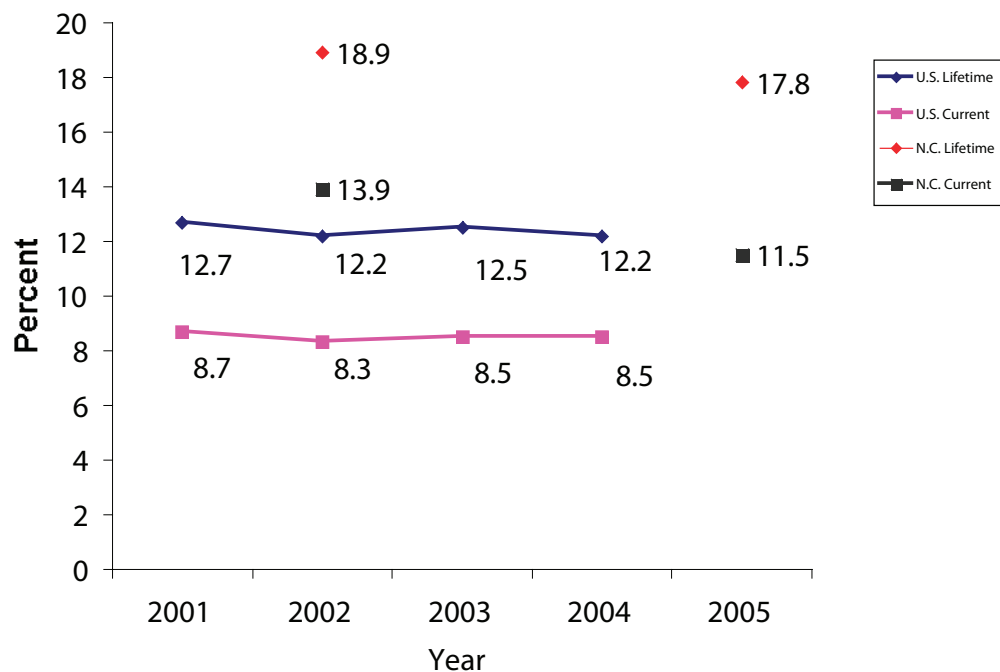


Table 4. Lifetime and Current Asthma Prevalence for the United States and North Carolina^{1,2,3}, Children (≤ 17 years old), 2001-2005

Year	U.S. Lifetime Asthma ¹	N.C. Lifetime Asthma	U.S. Current Asthma ¹	N.C. Current Asthma
2001	12.7	*	8.7	*
2002	12.2	18.9 ²	8.3	13.9 ²
2003	12.5	*	8.5	*
2004	12.2	*	8.5	*
2005	*	17.8 ³	*	11.5 ³

* Data not available

¹ U.S. estimates are taken from the NHIS which asks "Has a doctor or other health professional ever told you that (your child) had asthma?" as a measure for lifetime asthma. For current asthma, the NHIS asked "Does (your child) still have asthma?"

² The 2002 N.C. BRFSS asked, "How many of the children (in your household) have ever been diagnosed with asthma?" as the measure for lifetime asthma, and "How many of these children still have asthma?" as the measure for current asthma.

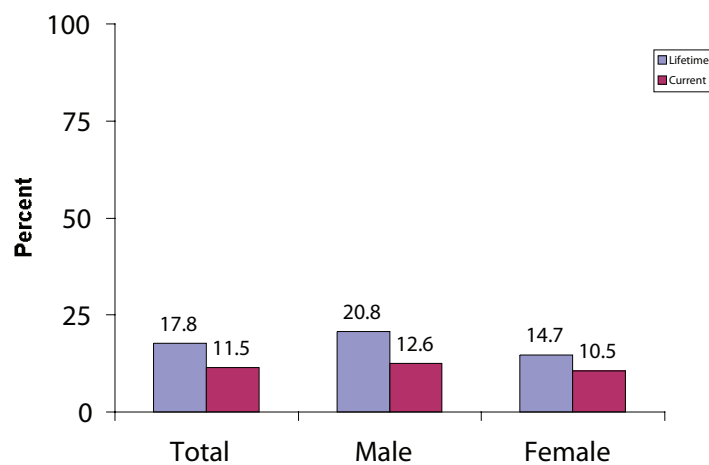
³ The 2005 N.C. CHAMP asked "Has a doctor ever told you that (your child) has asthma?" for the lifetime asthma and "Does (your child) still have asthma?" for current asthma.

Data Source: National Health Interview Survey, 2001-2004, BRFSS, North Carolina, 2002, CHAMP, North Carolina 2005

Lifetime and Current Asthma

North Carolina Children

Figure 9. Prevalence of Lifetime and Current Among Children¹ (≤ 17 years), Total and by Sex, North Carolina, 2005



¹ Question regarding children who currently have asthma asked only of respondents who reported children with asthma living in the same household.
Data Source: CHAMP, North Carolina, 2005

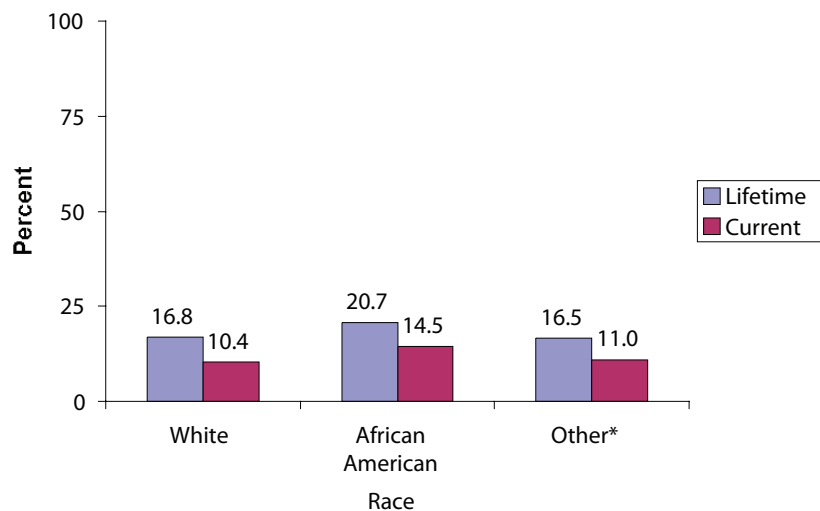


Summary of Figure 9:

- Among North Carolina children, males are significantly more likely to have a greater lifetime asthma prevalence (20.8%) than females (14.7%).
- Among North Carolina children, males tend to have a higher prevalence of asthma than females, which is a reversal of the pattern for adults, where females have the higher prevalence of asthma.^{9,12}
- No significant gender difference was seen in North Carolina's 2005 child current asthma prevalence.

Both lifetime and current asthma prevalence for North Carolina's children are higher than the national lifetime and current asthma prevalence.¹⁴

Figure 10. Prevalence of Lifetime and Current Asthma Among Children (≤ 17 years), by Race, North Carolina, 2005



*Based on numerator less than 50, interpret with caution
Data Source: CHAMP, North Carolina, 2005

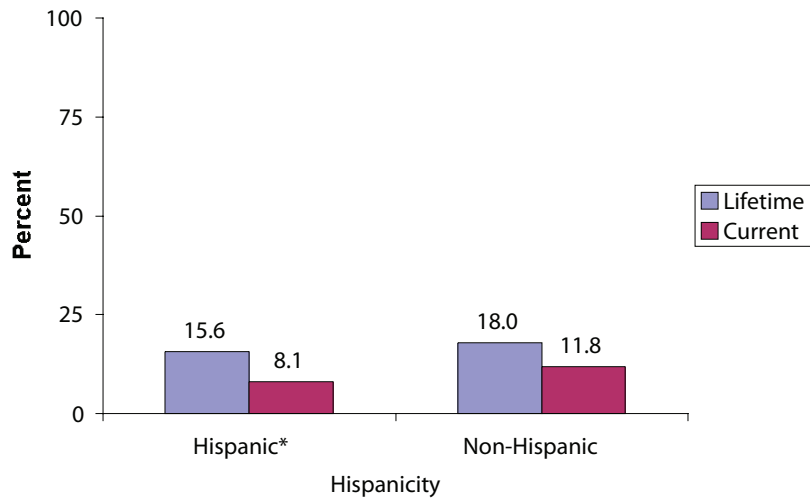
Summary of Figure 10:

- Although data suggest that African American children in North Carolina have a higher prevalence of lifetime asthma (20.7%) and current asthma (14.5%) than white children (lifetime asthma = 16.8%, current asthma = 10.4%), the difference is not significant.



White, African American, and children of other races in North Carolina have a higher prevalence of lifetime and current asthma than the national prevalence.¹⁴

Figure 11. Prevalence of Lifetime and Current Asthma Among Children (≤ 17 years), by Hispanicity, North Carolina, 2005



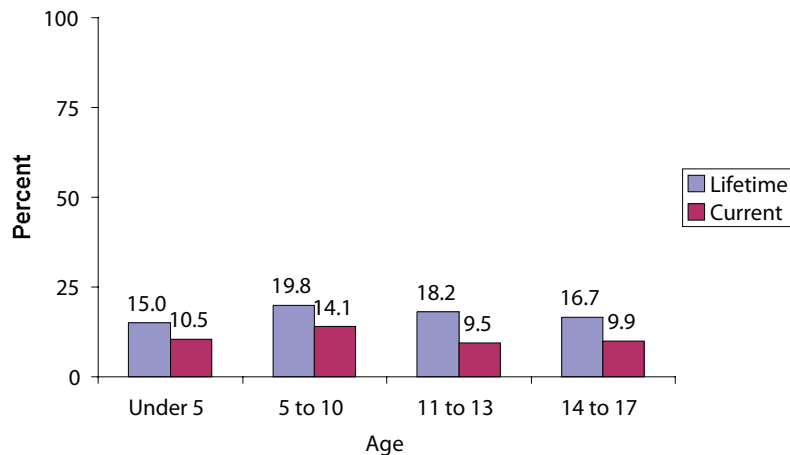
*Based on numerator less than 50, interpret with caution.
Data Source: CHAMP, North Carolina, 2005

Summary of Figure 11:

- There are no significant differences in lifetime asthma prevalence and current asthma prevalence for Hispanic children as compared to Non-Hispanic children in North Carolina.

Lifetime asthma prevalence and current asthma prevalence for both Hispanic and Non-Hispanic children in North Carolina are higher than national lifetime and current asthma prevalence rates.¹⁴

Figure 12. Prevalence of Lifetime and Current Asthma Among Children (≤ 17 years), by Age, North Carolina, 2005

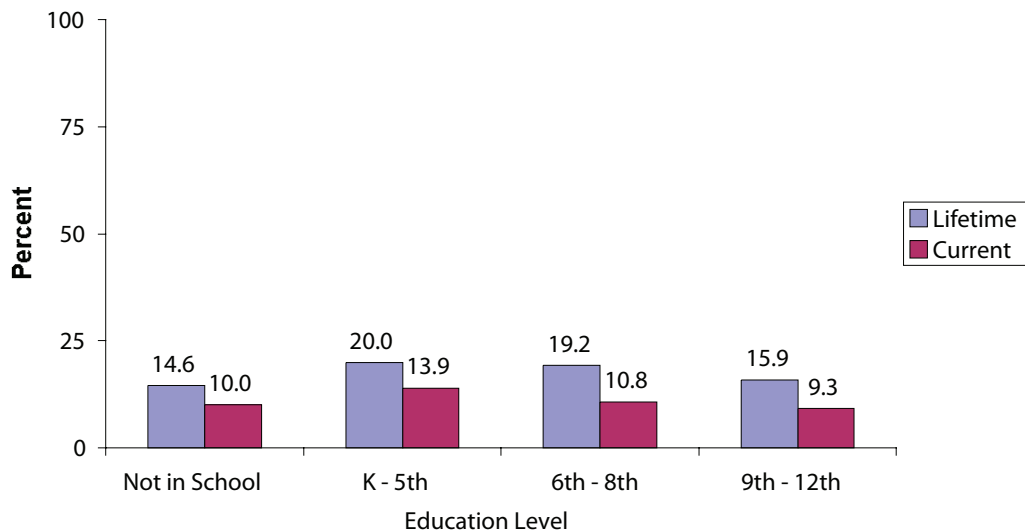


Data Source: CHAMP, North Carolina, 2005

Summary of Figure 12:

- Prevalence of lifetime asthma between the age groups shown here ranged from 15.0% to 19.8%. Current asthma prevalence ranged from 10.5% to 14.1%. However, no significant difference was seen in either lifetime or current asthma prevalence between the specified age groups among North Carolina children.

Figure 13. Prevalence of Lifetime and Current Asthma Among Children (≤ 17 years), by Education Level, North Carolina, 2005

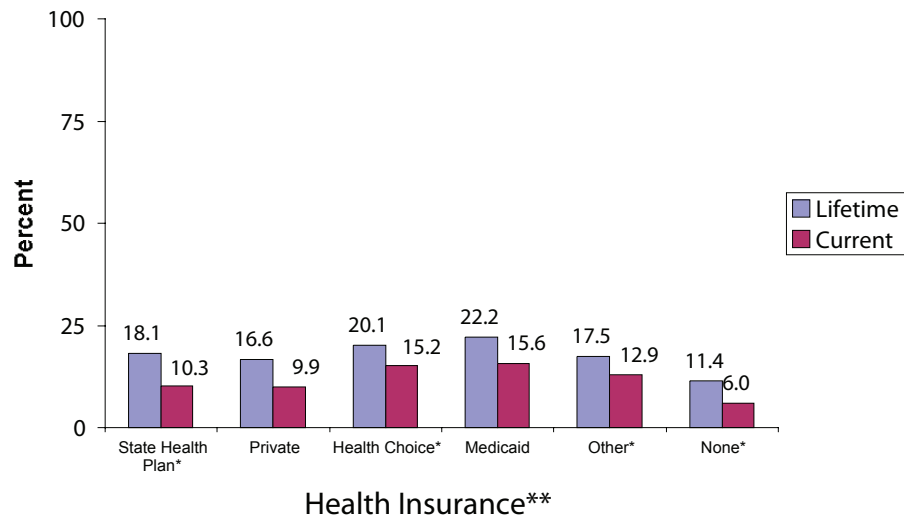


Data Source: CHAMP, North Carolina, 2005

Summary of Figure 13:

- While lifetime asthma prevalence ranged from 14.6% to 20.0% across all school grades (including those children not in school), no significant difference was seen between the grade levels.
- Current asthma prevalence across the grades ranged from 10.0% for those not in school to 13.9% for those in kindergarten through fifth grade; however, no significant difference was seen.

Figure 14. Prevalence of Lifetime and Current Asthma Among Children (≤ 17 years), by Health Insurance, North Carolina, 2005



*Based on numerator less than 50, interpret with caution.

**For and explanation on the different public insurance programs in North Carolina, please see Appendix H.

Data Source: CHAMP, North Carolina, 2005

Summary of Figure 14:

- Although not significant, the data is suggestive that lifetime asthma prevalence is higher among North Carolina children who are on Medicaid (22.2%), as compared to those who have private health insurance (16.6%).
- Children on Medicaid have a statistically significantly higher prevalence of current asthma (15.6%) than do North Carolina children who have private medical insurance (9.9%).

According to the 2004 National Health Interview Survey, children in poor families were more likely to have ever been diagnosed with asthma (14.0%) than children in families that were not poor (12.0%).¹⁴

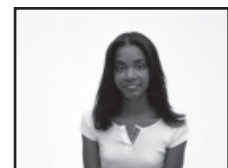


Table 5. Lifetime and Current Asthma Prevalence Among Children (≤ 17 years), by Sex, Race, Ethnicity, Age Group, Education Level, and Health Insurance, North Carolina, 2005

Lifetime Asthma			Current Asthma		
	2005			2005	
	Rate (%)	95% CI		Rate (%)	95% CI
Total	17.8	16.4-19.4	Total	11.5	10.3-12.9
Sex			Sex		
Male	20.8	18.6-23.2	Male	12.6	10.8-14.6
Female	14.7	12.8-16.9	Female	10.5	8.8-12.4
Race			Race		
White	16.8	15.1-18.7	White	10.4	9.0-11.9
African American	20.7	17.4-24.4	African American	14.5	11.7-17.9
Other Minorities	16.5	12.4-21.5	Other Minorities	11.0*	7.7-15.4
Ethnicity			Ethnicity		
Hispanic	15.6*	10.9-21.8	Hispanic	8.1*	4.7-13.7
Non-Hispanic	18.0	16.4-19.6	Non-Hispanic	11.8	10.5-13.2
Age			Age		
Under 5	15.0	11.8-18.7	Under 5	10.5	7.9-13.9
5 to 10	19.8	17.2-22.6	5 to 10	14.1	11.8-16.7
11 to 13	18.2	15.0-21.9	11 to 13	9.5	7.2-12.5
14 to 17	16.7	14.1-19.7	14 to 17	9.9	7.8-12.4
Education Level			Education Level		
Not in School	14.6	11.6-18.2	Not in School	10.0	7.5-13.2
K – 5th	20.0	17.4-22.7	K – 5th	13.9	11.7-16.4
6th – 8th	19.2	15.9-23.0	6th – 8th	10.8	8.3-13.9
9th – 12th	15.9	13.2-18.9	9th – 12th	9.3	7.2-12.0
Health Insurance			Health Insurance		
State Health Plan	18.1*	12.9-24.9	State Health Plan	10.3*	6.3-16.2
Private	16.6	14.5-18.8	Private	9.9	8.3-11.8
Health Choice	20.1*	14.2-27.6	Health Choice	15.2*	10.0-22.5
Medicaid	22.2	18.7-26.2	Medicaid	15.6	12.6-19.2
Other	17.5	13.3-22.7	Other	12.9*	9.2-17.8
None	11.4*	7.8-16.3	None	6.0*	3.4-10.2

*Based on numerator less than 50, interpret with caution.
Data Source: CHAMP, North Carolina, 2005

Youth Risk Behavior Survey

H i g h S c h o o l

The Youth Risk Behavior Surveillance System (YRBS) monitors six categories of priority health-risk behaviors among youth and young adults. The YRBS includes a national school-based survey conducted by CDC as well as state and local school-based surveys conducted by state and local education and health agencies. The YRBS data are used to: 1) measure progress toward achieving 15 national health objectives for Healthy People 2010 and three of the 10 leading health indicators, 2) to assess trends in priority health-risk behaviors among high school students, and 3) to evaluate the impact of broad school and community interventions at the national, state, and local levels.¹⁵

In the spring of every odd-numbered year, N.C. Healthy Schools implements a statewide Youth Risk Behavior Survey. The N.C. YRBS helps assess behaviors in youth that impact their health now and in the future. Below are the results from the 2005 North Carolina YRBS (note: the data on middle school students can be found in Appendix F). In 2005, the high school YRBS collected a total of 3,874 surveys, a 64% completion rate. The 2005 middle school YRBS had a completion rate of 58%, for a total of 3,659 surveys.

The YRBS, like the N.C. BRFSS and CHAMP, includes the measures of lifetime and current asthma. Lifetime asthma is estimated with a question *“Have you have been told by a doctor or nurse that you have asthma.”* Current asthma is estimated with a question that is slightly different than the questions asked by the BRFSS and CHAMP. The YRBS asks *“Have you ever been told by a doctor or nurse that you have asthma and have asthma but have not had an episode of asthma or an asthma attack during the past 12 months or have had an asthma episode or an asthma attack during the past 12 months?”*

Table 7. Lifetime Asthma Prevalence among High School Students by Age, Grade, Race, and Sex, North Carolina and United States, YRBS¹, 2005

	Total Percent (95% CI)	Males Percent (95% CI)	Females Percent (95% CI)
North Carolina	20.1% (17.9-22.2)	21.8% (19.0- 24.5)	18.4% (15.9- 21.0)
United States	17.1% (± 0.9)	17.3% (± 1.4)	17.0% (± 1.3)
AGE – N.C. only			
Age ≤ 15	20.3% (16.9- 23.8)	24.5% (18.7- 30.2)	16.5% (13.6- 19.5)
Age 16 or 17	20.3% (18.3- 22.2)	21.4% (18.7- 34.2)	19.2% (15.9- 22.4)
Age ≥ 18	18.4% (10.0- 26.9)	15.2% (9.0- 21.5)	22.0% (9.0- 34.9)
GRADE			
9th Grade - N.C.	20.7% (18.2- 23.3)	24.1% (18.9- 29.3)	17.2% (13.0- 21.5)
U.S.	18.5% (± 2.1)	18.3% (± 3.1)	18.7% (± 2.2)
10th Grade – N.C.	20.2% (15.7- 24.6)	24.7% (19.4- 30.0)	15.6% (11.7- 19.6)
U.S.	17.6% (± 1.9)	17.7% (± 2.3)	17.5% (± 2.7)
11th Grade – N.C.	18.9% (15.0- 22.8)	20.4% (16.8- 24.0)	17.5% (11.9- 23.2)
U.S.	16.4% (± 1.7)	18.2% (± 2.5)	14.6% (± 2.0)
12th Grade – N.C.	19.5% (13.1- 25.8)	14.6% (10.7- 18.5)	24.2% (13.3- 35.1)
U.S.	15.4% (± 1.7)	14.1% (± 2.5)	16.8% (± 2.4)
RACE/ETHNICITY			
African American – N.C.	28.1% (22.0- 34.2)	31.5% (23.0- 40.1)	25.3% (18.2- 32.4)
U.S.	18.8% (± 1.6)	20.1% (± 2.7)	17.6% (± 2.5)
Hispanic/Latino – N.C.	16.3% (11.1- 21.5)	22.3% (15.1- 29.5)	9.3% (3.9- 14.7)
U.S.	16.9% (± 2.5)	17.8% (± 3.2)	16.0% (± 3.2)
White – N.C.	16.2% (14.3- 18.0)	17.2% (14.8- 19.5)	15.1% (12.6- 17.7)
U.S.	16.4% (± 1.2)	16.1% (± 1.9)	16.8% (± 1.9)
All Other Races – N.C.	21.2% (15.0- 27.3)	*	*
Multiple Races - N.C.	25.9% (15.5- 36.2)	*	*

¹Data is weighted

*Fewer than 100 cases

Data Source: YRBS United States and North Carolina, 2005

Summary of Table 7:

- The lifetime asthma prevalence for high school males in North Carolina is significantly larger (21.8%) than the lifetime asthma prevalence for high school males nationally (17.3%).
- The lifetime asthma prevalence for high school males in grades nine and 10 was statistically significantly greater (24.1% and 24.7%) than the lifetime asthma prevalence for males in grade 12 (14.6%).
- African American high school students in North Carolina had a significantly higher lifetime asthma prevalence (28.1%) than African American high school students nationally (18.8%).
- African American students in North Carolina had a significantly higher prevalence of lifetime asthma (28.1%) than Hispanic (16.3%) or white (16.2%) high school students.
- In North Carolina, white male high school students had significantly lower lifetime asthma prevalence (17.2%) than African American males (31.5%).
- White and Hispanic female high school students in North Carolina had a significantly lower prevalence of lifetime asthma (15.1% and 9.3%) than African American females in North Carolina (25.3%).
- Hispanic female students had significantly lower lifetime asthma prevalence (9.3%) than Hispanic males (22.3%) in North Carolina.



Table 8. Current Asthma Prevalence among High School Students by Age, Grade, Race, and Sex, North Carolina and United States, YRBS¹, 2005

	Total Percent (Count)	Males Percent (Count)	Females Percent (Count)
North Carolina	16.4% (14.8- 18.0)	16.3% (13.8- 18.9)	16.6% (14.3- 18.9)
United States	14.5% (± 0.8)	14.3% (± 1.3)	14.7% (± 1.1)
AGE - N.C. only			
Age ≤ 15	17.1% 14.3- 20.0)	18.8% (14.0- 23.6)	15.7% (12.7- 18.8)
Age 16 or 17	16.2% (14.1- 18.3)	15.7% (13.4- 18.1)	16.7% (13.0- 20.4)
Age ≥ 18	14.9% (9.1- 20.7)	11.4% (6.6- 16.2)	18.7% (9.3- 28.2)
RACE/ETHNICITY			
African American – N.C.	23.2% (18.4- 27.9)	23% (14.9- 31.1)	23.4% (17.6- 29.2)
U.S.	15.3% (± 1.7)	15.6% (± 2.8)	15.0% (± 2.3)
Hispanic/Latino – N.C.	9.6% (4.5- 14.8)	13.1% (6.1- 20.2)	5.4% (0.9- 10.0)
U.S.	14.2% (± 2.2)	14.4% (± 2.8)	14.1% (± 2.8)
White – N.C.	13.8% (12- 15.5)	13.7% (11.1- 16.2)	13.8% (11.5- 16.1)
U.S.	14.2% (± 1.1)	13.7% (± 1.9)	14.8% (± 1.5)
All Other Races – N.C.	12% (5.0- 19.1)	*	*
Multiple Races - N.C.	18.4% (10.3,-26.5)	*	*

¹ Data is weighted

*Fewer than 100 cases

Data Source: YRBS United States and North Carolina, 2005



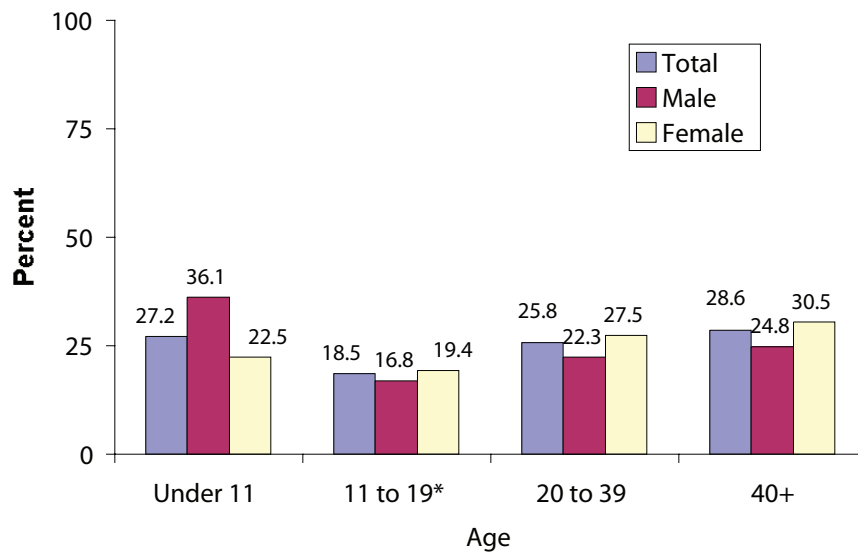
Summary of Table 8:

- African American high school students in North Carolina had a higher prevalence of current asthma (23.2%) than African American high school students nationally (15.3%).
- White and Hispanic high school students in North Carolina had a significantly lower current asthma prevalence (13.8% and 9.6%) than African American high school students (23.2%).
- African American female students in North Carolina had a higher current asthma prevalence (23.4%) than female African American students nationally (15%).
- Hispanic female students had significantly lower current asthma prevalence (5.4%) than both white (13.8%) and African American female students (23.4%); white female students had significantly lower current asthma prevalence than African American females.
- Grade breakdowns for current asthma prevalence among high school students showed no differences among the groups and therefore were omitted from this table.

Age At Diagnosis of Asthma

While many people are diagnosed with asthma in childhood, it can develop and manifest at anytime in the life of a person. Individuals who develop asthma as adults are said to have adult onset asthma, which can occur in a variety of situations. It is currently unknown what causes asthma, including adult onset asthma. Allergens may play an important role, as well as heredity. In women, hormonal fluctuations and changes may play a role. Data from Harvard's ongoing Nurses Health Study found that postmenopausal women who took estrogen as hormone replacement for 10 years or longer were more likely to develop asthma than were women who never used estrogen. Occupational exposure to workplace material can cause airway inflammation and clinical signs of asthma.^{16,17}

Figure 15. Age at First Asthma Diagnosis¹, Adults (≥ 18 years), North Carolina, 2005



¹Response to the question "How old were you when you were first told by a doctor, nurse, or other health professional that you had asthma?" Question was asked only of those who reported having asthma currently.

Table 9. Age at First Asthma Diagnosis¹, Adults (≥ 18 years), North Carolina, 2005

2005	Under 11	11 to 19	20 to 39	40+
Total	27.2%	18.5%	25.8%	28.6%
(95% CI)	(23.5, 31.2)	(15.0, 22.6)	(22.4, 29.4)	(25.5, 31.9)
Male	36.1%	16.8%*	22.3%	24.8%
(95% CI)	(28.4, 44.5)	(10.6, 25.6)	(16.2, 30.0)	(19.4, 31.1)
Female	22.5%	19.4%	27.5%	30.5%
(95% CI)	(18.9, 26.7)	(15.5, 24.0)	(23.8, 31.6)	(27.0, 34.3)

*Based on numerator less than 50, interpret with caution.
Data Source: BRFSS, North Carolina, 2005

Summary of Figure 15 and Table 9:

- Overall, North Carolinians were significantly more likely to be diagnosed under age 11 (27.2%) than between the ages of 11 and 19 (18.5%). North Carolinians age 40 and older were also significantly more likely to be diagnosed with asthma (28.5%) than those between the ages of 11 and 19.
- For adults diagnosed age 40 and older, there is a significant increase in the percentage diagnosed with asthma in 2005 (28.6%) as compared with 2002 (19.8%).
- Males were significantly more likely to be diagnosed with asthma under the age of 11 (36.1%) than females (22.5%).
- The data suggest that males are more likely to be diagnosed before 11 than at any other age, with the results being significantly less for males age 11 to 19 (16.8%).
- Conversely, females were significantly more likely to be diagnosed with asthma at age 40 and older (30.5%) than at age 19 and younger (age 11 to 19 = 19.4%, under 11 = 22.5%)



Key Findings From This Chapter

Adults

- In 2005, 10.1% of adults (age ≥ 18 years) in North Carolina reported ever having been told by a health care provider that they have asthma. Of those adults in North Carolina, 6.5% of reported currently having asthma.⁵²
- Adult females in North Carolina have a 1.45^c greater odds than adult males to have lifetime asthma (ever having been diagnosed with asthma by a health care provider), and have a 1.79^d greater odds than males to have current asthma.⁵²
- North Carolina adults living in households with an income less than \$15,000 are 1.78 times as likely to have lifetime asthma and are 2.14 times as likely to have current asthma than those who live in households that make more than \$15,000 a year.⁵²

Children

- In 2005, 17.8% of children (age ≤ 17 years) in North Carolina reported ever having been told by a health care provider that they have asthma. Of those children, 11.5% report that they still currently have asthma.⁵³
- Male children in North Carolina have a 1.5^e greater odds of having lifetime asthma (ever having been diagnosed with asthma by a health care provider) as female children in N.C.⁵³
- According to the 2004 National Health Interview Survey (NHIS), the national median for lifetime asthma was 12.2% for children. For current asthma, the national median reported in the 2004 NHIS was 8.5% for children. Although 2004 data are not available for North Carolina children, the 2005 data that are available do suggest that North Carolina's childhood lifetime asthma prevalence (17.8%) and current asthma prevalence (11.5%) greatly exceed the national median.^{14,53}



^cOdds Ratio (an approximation of the rate ratios with rare diseases), 95% Confidence Interval (CI) 1.3-1.6

^dOdds Ratio, 95% CI 1.6-2.1

^eOdds Ratio, 95% CI 1.3-1.8